TABLE 13.—Trends in public knowledge about the health risks of passive smoking

Survey	Year	Reference	Smoking is hazardous to nonsmokers' health (percentage who agree by smoking status)				
			Current smokers	Former smokers	Never smokers	All nonsmokers	All adults
1. Roper	1974	Roper 1978	30			57	46
2. Roper	1976	Roper 1978	38			61	52
3. Roper	1978	Roper 1978	40			69	58
4. AUTS[a]	1986	US DHHS, in press	69	82	87	85	81
5. NHIS[b]	1987		68	85	88		81
6. Gallup	1987	ACS 1988b	64	86	89		81

[a]Percentages presented here are slightly lower than those previously published (CDC 1988) because the latter did not include "don't know" responses in the denominator.

[b]Preliminary first-quarter data (unpublished). Year-end percentage for all adults is 81 percent.

NOTE: Actual questions:

1–3. Is smoking hazardous to nonsmokers' health? (probably is hazardous, probably doesn't have any real effect, don't know)

4. Think now for a moment about a nonsmoker who lives or works with smokers . . . . Do you think that exposure to tobacco smoke is harmful or not harmful to the nonsmoker's health?

5. *The smoke from someone else's cigarette is harmful to you. (strongly agree, agree, disagree, strongly disagree)*[*]

6. If people smoke, do you think that it *is* harmful or is *not* harmful to people who are near them? (yes, harmful; no, not harmful; can't say/no opinion)

[*]Percentages include those who "strongly agree" or "agree."

like a drug addiction." Of current smokers, 79.6 answered "yes" to the question, "Do you think you are addicted to cigarettes?" (Canadian Gallup 1986)

Interaction Between Smoking and Other Exposures

The 1985 Surgeons General's Report (US DHHS 1985) reviewed evidence regarding the interaction between smoking and a variety of occupational exposures in causing disease. With respect to the interaction between smoking and asbestos, the Report concluded that these two exposures act synergistically to increase the risk of lung cancer. The risk of lung cancer in cigarette-smoking asbestos workers is more than fiftyfold the risk in nonsmokers who have not been exposed to asbestos.

Few data are available on public knowledge of these interactions. The 1980 Roper survey (unpublished data, FTC) asked respondents about their belief concerning the following statement: "If you smoke and have worked with asbestos you are at least 50 times more likely to get lung cancer than if you have done neither." Seventy-four percent of respondents (and 69 percent of smokers) said that they "know it's true" or "think it's true."

Smokeless Tobacco

Smokeless tobacco (ST) use leads to increased risk of oral cancer and nicotine addiction (US DHHS 1986c).

No data are available to assess trends in public knowledge of the health risks of ST use. In the 1986 AUTS, 78 percent of adults thought that the use of chewing tobacco is harmful in any way to a person's health. Similarly, 73 percent thought that the use of snuff is harmful to a person's health. Current smokers were less likely to know about the health effects of using chewing tobacco and snuff (71 and 66 percent, respectively) compared with former smokers (79 and 75 percent, respectively) and never smokers (81 and 76 percent, respectively).

According to the 1987 NHIS (preliminary first-quarter estimates), 82 percent of adults thought that a relationship exists between chewing tobacco use and mouth and throat cancers. Seventy-seven percent thought that snuff use is related to these cancers (unpublished data, National Cancer Institute).

Personal Health Risks for Smokers

There have been few attempts to determine smokers' beliefs regarding their own personal risk. Several Gallup surveys conducted between 1977 and 1987 asked respondents, "Do you think cigarette smoking is or is not harmful to your health?" (Table 14). Data are available for current smokers for the years 1981 and 1985. The proportion of current smokers answering in the affirmative increased from 80 percent in 1981 to 90 percent in 1985. These data, at first glance, suggest that a high percentage of smokers

TABLE 14.—Trends in public beliefs about one's personal risk from smoking

Survey	Year	Reference	Cigarette smoking is harmful to YOUR health (percentage who agree by smoking status)				
			Current smokers	Former smokers	Never smokers	All nonsmokers	All adults
1. Gallup	1977	Gallup 1985					90
2. Gallup	1978	Gallup 1978	83			95	90
3. Gallup	1981	Gallup 1985	80			96	90
4. Gallup	1983	Gallup 1985					92
5. Gallup	1985	Gallup 1985	90	96		96	94
6. Gallup	1987	ALA 1987					94
7. NHIS[a]	1987		55				

[a]Preliminary first-quarter data (unpublished). Year-end percentage is 55 percent.

NOTE: Actual questions:

1–6. Do you think cigarette smoking is or is not harmful to your health?

7. Do you believe your smoking has affected your health in any way?

perceive a personalized risk from smoking. However, nonsmokers were asked to respond to the question, implying that the wording may not be understood by some respondents as referring to truly personalized health risks. Wording such as, "Do you think that *your* cigarette smoking is or is not harmful to your health?" might elicit different responses.

The 1987 NHIS (unpublished data, National Cancer Institute) showed that 55 percent of current smokers answered "yes" to the question, "Do you believe your smoking has affected your health in any way?" The principal reason this percentage is substantially lower than that obtained by the 1985 Gallup survey (90 percent) is probably that the former was likely to be understood as referring to overt symptoms or disease, while the latter was likely to be understood as referring to the risk of harm.

Another approach to measure perceptions of personalized risk has been to ask smokers whether they are "concerned" about the effects of smoking on *their* health. It appears that smokers are more likely today to be concerned that smoking is harmful to their own health. In 1964, 50 percent of current smokers were concerned about the possible effects of smoking on their own health (Table 15); this proportion increased to 75 percent by 1986. However, in 1986, only 18 percent of smokers were *very* concerned about the effects of smoking on their health; 56 percent of smokers were only fairly or slightly concerned; and 24 percent were not at all concerned.

From 1970–86, the percentage of smokers who were very concerned about the possible effects of smoking on their health decreased from 29 to 18 percent, while the percentage who were only slightly concerned increased from 19 to 34 percent. This redistribution within the population of smokers having any concern may have occurred because a much greater proportion of those who were very concerned may have quit smoking during this period; therefore, they would not have been included in subsequent surveys.

A third approach to assess personalized risk, or more correctly, the absence of personalized risk, is to ask smokers if they believe themselves to be at lower risk than other smokers. In 1986, 21 percent of adults thought that the cigarettes they smoked were less hazardous than other cigarettes (Table 3).

Other data pertaining to perceptions of personalized risk from ETS and from smoking among adolescents appear in the sections on Involuntary Smoking (above) and Adolescent Knowledge (below).

How Harmful Is Smoking?

The data presented above reveal that a vast majority of adults agree that smoking is hazardous to health and correctly recognize the conditions that are associated with smoking. However, these data do not address the depth of the public's understanding regarding the absolute risk of smoking, the relative risks of smoking, the population-attributable risk of smoking, and the risk of smoking in comparison with other risks. A more in-depth understanding of the risks of smoking may be much more important in promoting behavioral change than the more superficial beliefs measured by the data presented above. Unfortunately, only limited data are available to address the public's in-depth understanding of the risks of smoking.

TABLE 15.—Trends in smokers' concern about the effects of smoking on their own health

Survey	Year	Concern about the possible effects of cigarette smoking on your health (percentage who responded by level of concern)				
		Very concerned	Fairly concerned	Only slightly concerned	Not concerned	Any concern[a]
1. AUTS	1964	13	18	19	50	50
2. AUTS	1966	12	17	18	53	47
3. AUTS	1970	29	22	19	31	69
4. AUTS	1975	25	23	19	32	68
5. AUTS	1986	18	22	34	24	75

[a]Very, fairly, or only slightly concerned.

NOTE: Actual questions:

1–5. Are you in any way concerned about the possible effects of cigarette smoking on your health?

SOURCE: US DHEW (1969, 1973, 1976a); US DHHS, *in press*.

Absolute Risk

Absolute risks can be described by the proportion of those exposed to a given risk factor who will actually die or develop the particular condition, or by the reduction in life expectancy caused by exposure. As many as one-third of heavy smokers aged 35 years will die before age 85 of diseases caused by their smoking (Mattson, Pollack, Cullen 1987), and 30-year-old smokers will shorten their lives an average of 6 to 8 years if they smoke a pack a day (US DHEW 1979a).

From 1970–78, the proportion of adults who believed that smoking a pack of cigarettes a day made a great deal of difference in longevity increased slightly from 42 to 50 percent (FTC 1981). However, most adults underestimate the impact of smoking on longevity, according to a 1980 Roper survey. In this survey, 30 percent of the population and 41 percent of smokers did not know that a typical 30-year-old smoker shortened his life expectancy *at all* by smoking (FTC 1981). Among those who did know that smoking reduces one's life expectancy, many underestimated the degree to which this is true. On average, nonsmokers underestimated the loss in life expectancy by about 2 years and smokers underestimated it by more than 4 years.

Relative Risk

Relative risk describes the risk of dying or developing disease for a person exposed to a particular risk factor compared with someone not exposed. For example, male smokers are 22 times more likely and female smokers are 12 times more likely to develop lung cancer compared with nonsmokers of the same sex (Chapter 3).

In the 1980 Roper study, respondents were asked if smokers were specifically 10 times more likely to die from lung cancer (the estimated relative risk derived from the data available at that time); 23 percent of the general population and 39 percent of smokers did not believe this statement. Some of this lack of belief may be due to the use of a specific figure. However, using more general terms, 16 percent of adults and 25 percent of smokers did not think that smokers were "many times" more likely than nonsmokers to develop lung cancer (FTC 1981).

Attributable Risk and Smoking-Attributable Mortality

Attributable risk refers to that proportion of a disease that can be "attributed" to (or is caused by) a particular risk factor, such as smoking. For example, smoking accounts for about 80 to 90 percent of lung cancer deaths and 80 to 85 percent of deaths from COPD (Chapter 3).

Much of the information regarding the public's understanding of the magnitude of the risks of smoking comes from the Roper survey conducted in 1980. In this survey, 43 percent of adults and 49 percent of smokers did not know that smoking causes *most* of the cases of lung cancer and 22 percent of adults and 27 percent of smokers did not know that smoking even causes *many* cases of lung cancer (FTC 1981). In the 1987 NHIS (unpublished data, National Cancer Institute), 28 percent (preliminary first-quarter estimate) of smokers and 16 percent (year-end figure) of the general population

disagreed with the statement, "Most deaths from lung cancer are caused by cigarette smoking."

Attributable risk figures can be used to calculate smoking-attributable mortality. The 1979 Surgeon General's Report (US DHEW 1979a, p. ii) attributed approximately 350,000 deaths each year to cigarette smoking. In 1985, an estimated 390,000 deaths in the United States were attributable to smoking (Chapter 3). In the 1979 Chilton survey, adults aged 29 to 31 years were asked: "In the United States, two million people die each year. About how many of these deaths are probably related to cigarette smoking?" The responses offered by the interviewer, along with the percentages chosen, were: 10,000 deaths, 22 percent; 50,000, 16 percent; 100,000, 16 percent; 300,000, 17 percent; don't know, 31 percent (Chilton 1980).

Comparative Risk

The risk of dying from smoking can be compared with the risk of dying from other behavioral risk factors, such as living under stress, eating high-cholesterol foods, or drinking heavily. The public's perception of these comparative risks was assessed by Roper surveys from 1970–78 (Table 16). In 1970, living under a lot of tension and stress and not getting regular exercise were considered by more adults to make a great deal of difference in longevity than was smoking a pack of cigarettes daily. In contrast, fewer adults considered regularly eating food high in cholesterol, consuming three or four drinks of liquor a day, or being 20 lb overweight to have an effect on longevity. In 1978, only stress was considered by more adults to make a great deal of difference on longevity.

In 1983, Louis Harris and Associates conducted a national telephone survey of 1,254 randomly selected adults for *Prevention* magazine (Harris 1983). Respondents were asked to rank 24 health and safety factors on a 1-to-10 (low-to-high) scale of importance. A sample of 103 health experts (medical school chairmen of preventive medicine, public health school deans, government officials, journal editors, and others) was also interviewed and was asked to make the same rankings. All of the public's mean rankings were in the top half of the scale; thus, none of the factors were seen as trivial in importance. "Not smoking" was ranked near the middle, below "keeping water quality acceptable," "having smoke detectors in the home," "taking steps to control stress," and "getting enough vitamins and minerals" (Figure 1). In contrast, the panel of experts ranked "not smoking" at the top of the list (Figure 2).

The 1986 AUTS asked five questions comparing the perceived risk of cigarette smoking with the perceived risk of drinking alcoholic beverages, smoking marijuana, being exposed to air pollution, driving without a seat belt, and being 20 lb overweight (Table 17). In each of the comparisons, never smokers were more likely to disagree than to agree that cigarette smoking is less harmful than the other risks. Only in the case of marijuana smoking are the percentages of those agreeing and disagreeing similar. On the other hand, current smokers were more likely to agree than to disagree that cigarette smoking is less dangerous than marijuana smoking and air pollution.

Dolecek and coworkers (1986) surveyed 973 adults in Chicago from a sample of family members of students who participated in AHA's Chicago Heart Health Cur-

TABLE 16.—Trends in public knowledge about the health risks of smoking compared to other risks, 1970–78

Question	It makes a great deal of difference in longevity if a person . . . (percentage who agree by year)				
	1970	1972	1974	1976	1978
lives under a lot of tension and stress	69	72	74	76	74
doesn't get regular exercise	49	38	38	33	34
smokes a pack of cigarettes a day	42	42	44	45	50
regularly eats a lot of food with high cholesterol	31	34	38	39	43
drinks 3 or 4 highballs a day	29	34	35	37	39
is 20 pounds overweight	23	26	25	24	24

SOURCE: Roper (1978).

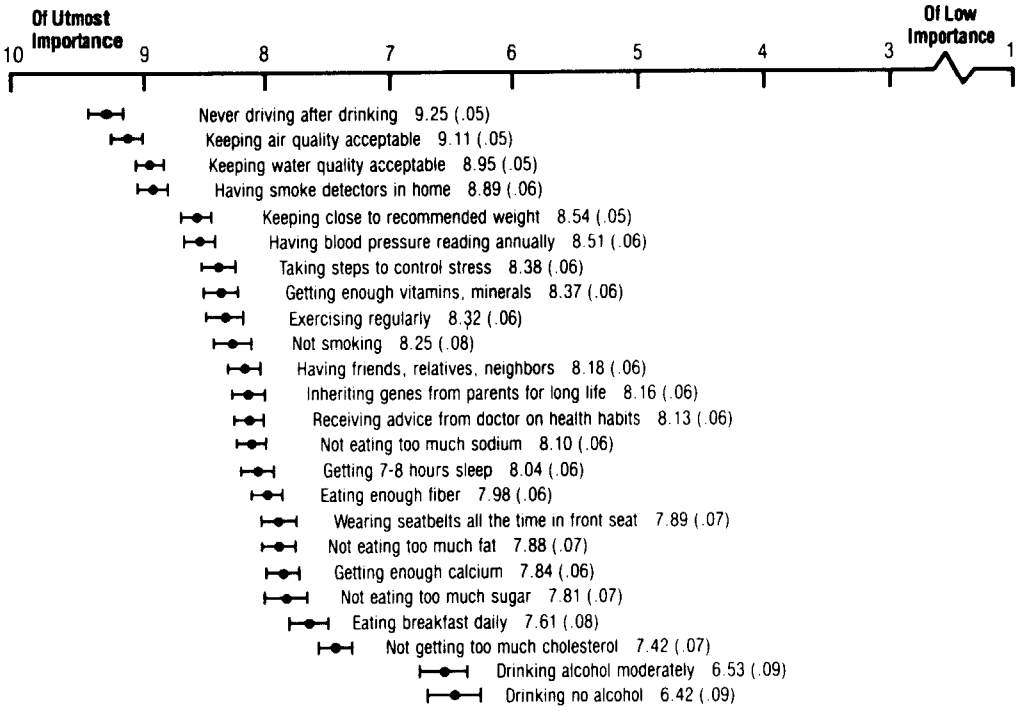

FIGURE 1.—Adult public's rating of 24 health and safety factors

NOTE: Shown above is the mean importance rating for each factor given by 1,254 adults using a 1 to 10 scale. Given in parentheses is the standard error of the mean. The 95-percent confidence interval around each mean is graphically displayed as a band or range consisting of ± two standard error values.

SOURCE: Harris (1983).

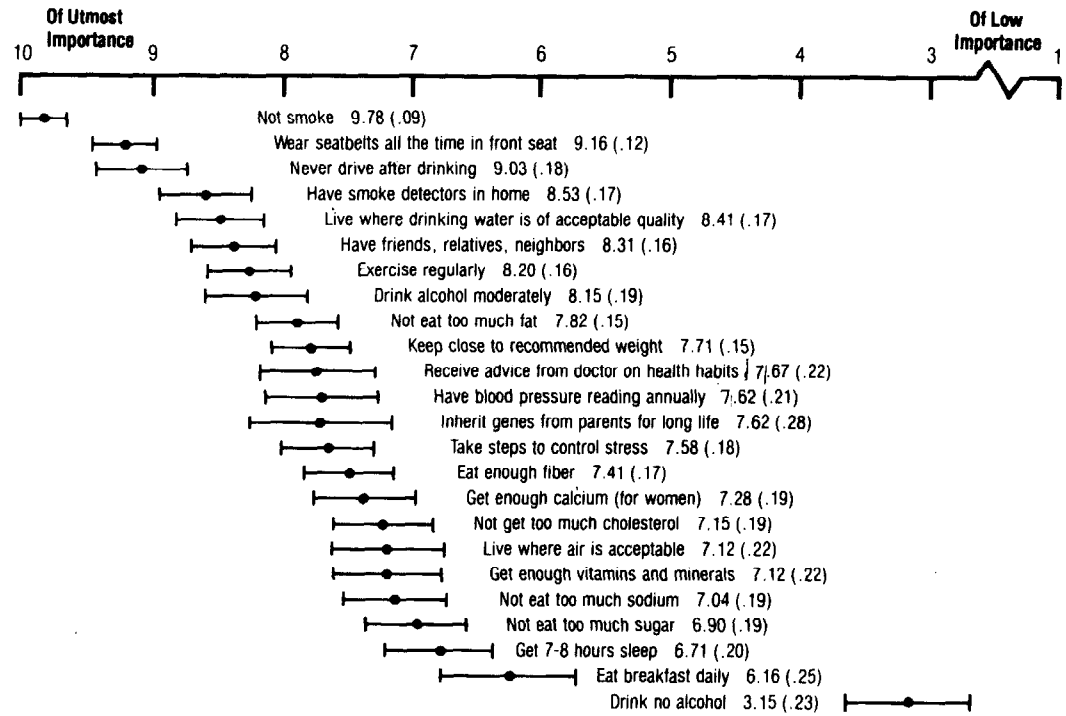

FIGURE 2.—Experts' rating of 24 health and safety factors

NOTE: Shown above is the mean importance rating for each factor given by 103 experts using a 1 to 10 scale. Given in parentheses is the standard error of the mean. An indicator of the variability of individual ratings around each mean is graphically displayed as a band or range consisting of ± two standard error values.

SOURCE: Harris (1983).

TABLE 17.—Public knowledge about the harmfulness of cigarette smoking compared with other risks, 1986

	Percentage who agree			Percentage who disagree		
	Current smokers	Former smokers	Never smokers	Current smokers	Former smokers	Never smokers
Moderate use of cigarettes is less harmful to health than moderate use of alcoholic beverages.	32	21	20	54	63	63
Smoking cigarettes is less harmful to health than smoking marijuana.	48	38	37	33	34	40
Air pollution is a greater health risk than cigarettes.	48	30	28	41	54	57
Smoking cigarettes is less dangerous than driving without a seat belt.	36	25	26	52	58	68
Smoking is less harmful than being 20 pounds overweight.	31	19	18	59	69	71

NOTE: Percentages of those who agree include those who "strongly agree" or "somewhat agree." Percentages of those who disagree include those who "strongly disagree" or "somewhat disagree."
SOURCE: AUTS 1986 (US DHHS, in press).

riculum Program during the 1980–81 school year. Respondents were asked to select the three major risk factors for CVD from a list of nine. The percentage responses for these risk factors were: high blood pressure, 25 percent; overweight, 22 percent; stress/tension/worry, 14 percent; *cigarette smoking*, 13 percent; heredity/family history, 7 percent; eating too much cholesterol (fat), 7 percent; not enough rest/working too hard, 6 percent; not enough exercise, 4 percent; and diabetes, 2 percent.

From 1982–86, Becker and Levine (1987) surveyed 90 adults with no known CHD who were siblings of patients hospitalized for recently documented CHD. Patients and siblings were all less than 60 years old. The siblings were randomized into an assessment group (interviewed within 2 weeks of the index patients' discharge and again 4 months later) and a control group (received only one interview at 4-month followup). Participants were asked in an open-ended question to name factors thought to cause or be associated with CHD. Smoking was identified by 81 percent of the control group (after stress, 91 percent) and was the risk factor most often cited by the assessment group (97 percent).

Folsom and others (1988) conducted two surveys in the metropolitan Minneapolis/St. Paul area during 1985–86. One survey sampled blacks aged 35 to 74 years, while the other sampled a primarily white population. Subjects were asked the open-ended question, "What do you think are the most important causes of cardiovascular diseases (heart attack or stroke)?" The percentage of blacks (total sample size=1,252) who identified smoking as one of the most important causes of CVD was 32 percent; stress/worry (54 percent) and improper diet (45 percent) ranked higher. Among whites (total sample size=1,870), smoking and improper diet were both ranked highest (54 percent).

In a survey conducted in 1987 by the Gallup Organization for ACS, 90 percent of adults reported that smoking cigarettes contributes to a higher risk of cancer. Lower percentages reported that a higher cancer risk is associated with suntan and sunburn (73 percent), alcohol (34 percent), high-fat diet (33 percent), and smoked and nitrite-cured meats (31 percent) (ACS 1988b).

For the studies reviewed above on comparative risk, data stratified by smoking status were available only from the 1986 AUTS.

Knowledge Among Adolescents About the Health Risks of Smoking

Because most regular cigarette smokers begin to smoke before age 21 (Chapter 5), it is important to consider teenagers' knowledge about the health effects of smoking. This knowledge can be addressed in the following categories: (1) general health effects of smoking, (2) personalized risk of smoking-related diseases, (3) risks of smoking compared with other health risks, (4) beliefs about addiction, and (5) health effects of ST use.

General Health Effects

Since 1975, beliefs among adolescents that cigarette smoking is harmful have increased. National data on knowledge of high school seniors about the health risks of smoking are available from the Monitoring the Future Project (sponsored by the Na-

TABLE 18.—Knowledge about the health risks of smoking among high school seniors, 1975–86, Monitoring the Future Project, National Institute on Drug Abuse

Survey year	How much do you think people risk harming themselves (physically or in other ways), if they smoke one or more packs of cigarettes per day? (percentage responding in each category)					
	Don't know	No risk	Slight risk	Moderate risk	Great risk	Any risk [a]
1975	2	3	9	35	51	95
1976	2	2	9	31	56	96
1977	2	2	9	29	58	96
1978	2	2	8	30	59	97
1979	1	2	7	27	63	97
1980	1	1	7	27	64	98
1981	1	1	6	28	63	98
1982	2	2	7	30	61	97
1983	1	2	7	29	61	97
1984	1	2	6	27	64	97
1985	2	2	6	24	67	97
1986	1	1	5	26	66	97

[a]Slight, moderate, or great risk of harm combined.

SOURCE: Bachman, Johnston, O'Malley (1980a,b, 1981, 1984, 1985, 1987); Johnston and Bachman (1980); Johnston, Bachman, O'Malley (1980a,b, 1982, 1984, 1986).

TABLE 19.—Perceived harmfulness of drugs among high school seniors, 1986; Monitoring the Future Project, National Institute on Drug Abuse

How much do you think people risk harming themselves (physically or in other ways), if they... (percentage of people responding)	Great risk
try one or two drinks of an alcoholic beverage (beer, wine, liquor)?	5
try marijuana (pot, grass) once or twice?	15
take one or two drinks nearly every day?	25
smoke marijuana occasionally?	25
try amphetamines (uppers, pep pills, bennies, speed) once or twice?	25
try barbiturates (downers, goofballs, reds, yellows, etc.) once or twice?	25
use smokeless tobacco regularly (chewing tobacco, plug, dipping tobacco, snuff)?	**26**
try cocaine once or twice?	34
have five or more drinks once or twice each weekend?	39
try LSD once or twice?	42
try heroin (smack, horse) once or twice?	46
take cocaine occasionally	54
smoke one or more packs of cigarettes per day?	**66**
take amphetamines regularly?	67
take barbiturates regularly?	67
take four or five drinks nearly every day?	67
take heroin occasionally?	68
smoke marijuana regularly?	71
take cocaine regularly?	82
take LSD regularly?	83
take heroin regularly?	87

NOTE: Possible responses included great risk, moderate risk, slight risk, no risk, don't know.
SOURCE: Bachman, Johnston, O'Malley (1987).

tional Institute on Drug Abuse) for every year since 1975. Although nearly all teenagers recognize some risk of harm from smoking, the proportion who think that smoking a pack or more a day causes great risk of harm increased from 51 percent in 1975 to 67 percent by 1985 (Table 18).

A 1975 survey (US DHEW 1975a) of teenagers who smoked revealed that many thought that the dangers of smoking were exaggerated for their age group (52 percent of girls; 54 percent of boys); that there was too much talk about things that were bad for them (43 percent of girls; 48 percent of boys); and that air pollution was just as important a cause of lung cancer as cigarettes (67 percent of girls; 51 percent of boys). In 1986, only 16 percent of high school seniors agreed with the statement, "The harmful

effects of cigarettes have been exaggerated" (see Table 24; Bachman, Johnston, O'Malley 1987) (data stratified by smoking status were not published).

Personalized Risk

In a survey of 895 students in grades 2 through 12 in 134 public schools in Milwaukee, WI, during the 1979–80 academic year, Leventhal, Glynn, and Fleming (1987) assessed the degree to which the students personalized the health risk from smoking. When asked, "Do you think that smoking can injure or hurt the body?" 98 percent answered affirmatively and were able to accurately name one or more body parts that are adversely affected by smoking. A subsample of 622 subjects (smokers and nonsmokers) was asked whether they "would be less likely, about as likely, or more likely to get sick from smoking than other people." Those answering "less likely" accounted for 47 percent of the smokers but only 36 percent of the nonsmokers, 47 percent of those who intended to become adult smokers versus 36 percent of those who did not intend to become adult smokers, and 41 percent of those from smoking families versus 28 percent of those from nonsmoking families. These findings suggest that although children and adolescents recognize smoking as harmful, they may not personalize the risk. This failure to personalize the perception of risk may play a role in the initiation of smoking.

Some teenagers may minimize or deny their personal risk because of a belief that certain smoking patterns are safe. In the 1974 and 1979 Teenage Smoking Surveys conducted by the Department of Health, Education, and Welfare (US DHEW 1976b, 1979b), about one-quarter of teenagers agreed with the statement, "There's nothing wrong with smoking cigarettes if you don't smoke too many." About one-third agreed with the statement, "Cigarette smoking is harmful only if a person inhales."

Comparative Risk

In the 1979 Chilton Survey (Chilton 1980), teenagers were asked which of the following caused the most deaths during the past year: traffic accidents, fires, cigarette smoking, or drug overdose. Traffic accidents were cited by 44 percent of teenagers, followed by drug overdose (21 percent), cigarette smoking (19 percent), and fires (6 percent).

The High School Seniors Survey includes questions about the risks associated with using a variety of licit and illicit drugs at different levels of intake. In 1986, 66 percent of high school seniors thought that smoking one or more packs of cigarettes per day causes great risk of harming oneself. More students saw great risk in the regular use of marijuana, cocaine, LSD, and heroin (Table 19). In contrast, more teenagers saw great risk in regular smoking compared with trying amphetamines, barbiturates, cocaine, or LSD; in trying or using occasionally marijuana or cocaine; or in trying alcohol, having one to two drinks per day, or having five or more drinks one or two times per week.

The *Weekly Reader* magazine includes a survey twice a year in the periodical, which is distributed throughout the country to more than 10 million children in grades 2

through 9. Surveys are filled out in class by students under a teacher's supervision. The topics addressed are rotated so that the same survey is repeated every 4 years. The Spring 1986 survey covered safety and health (Weekly Reader 1986). Of an estimated 400,000 student responses for grades 2 through 6, 128,000 were randomly chosen for analysis. Although the respondents do not represent a randomly selected sample, results pertaining to tobacco are presented here because of the large sample size and the paucity of data available for young children.

The survey included the following question: "Many people say the following things are harmful for kids to do. How harmful do you think each is for kids your age? (very harmful, somewhat harmful, not harmful) . . . overeating, eating junk food, listening to very loud music, smoking, chewing tobacco, staying up late, failing to get enough exercise." Grade-specific results for students in grades 4 through 6 showed that smoking (90 to 95 percent) and chewing tobacco (80 to 90 percent) were much more likely to be perceived as "very harmful" compared with the other choices, all of which were considered to be "very harmful" by less than 40 percent of respondents (except for loud music, among fourth graders—70 percent). However, these results should be interpreted with caution because of the possibility of sampling bias and the leading nature of the question.

Addiction

Of particular concern are teenagers who are unaware of the addictive nature of cigarette smoking, and who, therefore, may be tempted to "experiment" with smoking. In the 1974 and 1979 DHEW Teenage Smoking Surveys (US DHEW 1976b, 1979b), about one-quarter of the teenagers agreed with the statement, "Teenagers who smoke regularly can quit for good any time they like." About 60 percent agreed that "It's okay for teenagers to experiment with cigarettes if they quit before it becomes a habit." In the 1979 survey, teenagers were asked, "What would you say is the possibility that 5 years from now you will be a cigarette smoker?" Fifty percent of the current regular smokers (48 percent of boys and 52 percent of girls) answered "definitely not" or "probably not." These findings suggest that a large proportion of new smokers are unaware of or underestimate the addictive nature of smoking.

In 1975, 56 percent of girls aged 13 to 17 years and 62 percent of young women aged 18 to 35 years thought that smoking was as addictive as illegal drugs (US DHEW 1975a).

In the study by Leventhal, Glynn, and Fleming (1987) of 895 students in grades 2 through 12 in Milwaukee, WI, subjects were asked how hard it is for heavy smokers and for light smokers to quit smoking, and how heavy and light smokers feel when they quit. Answers were used to construct a "knowledge of addiction" scale. The investigators found that young people who smoke or who have smoking family members have lower "knowledge of addiction" scores. The authors speculate that these individuals may be "defending against the thought that either they or a parent has an uncontrollable problem."

Information on teenage beliefs concerning the addictiveness of ST use is discussed below.

In 1985, the Office of the Inspector General, Department of Health and Human Services, surveyed a nonrandom sample of 399 students in 11 junior high or middle schools and 20 high schools in 16 States regarding ST use (US DHHS 1986d). ST users were oversampled based on identification of users and nonusers by school officials. The sample was composed of 290 current ST users (73 percent) and 109 nonusers (27 percent). Eighty percent of junior high school users and 92 percent of high school users acknowledged that dipping snuff and chewing tobacco *can be* harmful to a person's health (Table 20). When asked about the extent of physical harm that may result from ST use, however, about half of users believed that there is no risk or only slight risk from regular use. One-third of junior high school users and only 5 percent of high school users thought that ST use may lead to mouth cancer. There was poor understanding of the effects of ST use on gum and dental conditions. One-quarter of junior high school users believed that regular ST use is not addictive, and more than one-third did not know that snuff contains nicotine. In summary, these findings suggest that users are substantially uninformed about the health effects and addictiveness of smokeless tobacco use. However, the degree to which these results can be generalized nationally is limited by the nonrepresentative nature of the sample.

Data from the Monitoring the Future Project showed that in 1986, a total of 59 percent of high school seniors believed that regular ST use poses a great (26 percent) or moderate (33 percent) risk of harm, compared with 36 percent who believed that ST use poses slight (28 percent) or no (8 percent) risk (Bachman, Johnston, O'Malley 1987).

Constituents of Tobacco Smoke

The estimated number of known compounds in tobacco smoke exceeds 4,000, including some that are pharmacologically active, toxic, mutagenic, carcinogenic, and antigenic (Chapter 2). One of these is carbon monoxide, whose presence in cigarette smoke is cited in one of the four health warnings rotated on cigarette packages and advertisements since 1985 (Chapter 7).

In a 1979 survey conducted by Chilton Research Services for the Federal Trade Commission (FTC 1981), respondents were asked, "Does cigarette smoke contain carbon monoxide?" Fifty-one percent of teenagers (aged 13–18) either did not know (21 percent) or said "no" (29 percent); 45 percent of adults (aged 29–31) either did not know (26 percent) or said "no" (19 percent).

In a 1980 Roper survey (FTC 1981), 53 percent of all respondents and 56 percent of smokers did not know or believe that "Cigarette smoke contains carbon monoxide, which is a dangerous gas."

In the 1986 AUTS, 62 percent of current smokers answered "yes" to the question, "As far as you know, does cigarette smoke contain carbon monoxide?" Thirteen percent said "no," and 25 percent did not know. Former and never smokers were not asked this question.

TABLE 20.—Beliefs about the health effects of smokeless tobacco (ST) use among 399 junior and senior high school students (percentage who agree) in 16 States, 1986

	Users		Nonusers
	Junior high school (N = 76)	High school (N = 214)	(N = 109)
ST use *can be* harmful	80	92	97
Risk from ST use			
None or slight	57	42	32
Moderate to great	43	58	68
Regular ST use may lead to mouth cancer	33	5	5
Gum and mouth problems among users are very rare	64	41	33
ST use increases risk of tooth stains, wear, and loss	24	11	16
Snuff does not contain nicotine	38	20	32
Regular ST use is not addictive	25	15	10
ST use is much more safe than cigarettes	81	81	59

NOTE: ST user defined as follows: has dipped or chewed more than 100 times, currently uses daily or at least 3 days per week, dipping at least three times on days of use. Nonuser defined as follows: has never dipped or chewed, or has only tried it a few times or more than a few times but fewer than 100 times.
SOURCE: US DHHS (1986d).

Health Benefits of Smoking Cessation

The overall mortality ratio of former smokers (compared with never smokers) declines with increasing years of abstinence. According to data reviewed in the 1979 Surgeon General's Report (US DHEW 1979a) from the U.S. Veterans Study and the British Doctors Study, overall mortality rates of former smokers are similar to those of never smokers 15 years after quitting (US DHEW 1979a). With respect to lung cancer mortality, the increased risk diminishes substantially by 5 to 9 years after quitting, but remains above the risk of never smokers for many more years except for those with fewer than 30 years of cigarette smoking (Chapter 2). A reduction in CHD mortality occurs within the first few years after cessation (US DHHS 1983). The risk of COPD mortality decreases eventually after smoking cessation but does not decline to equal that of never smokers, even after 20 years of cessation (US DHHS 1984).

In the 1986 AUTS, respondents were asked how long it takes before former smokers' chances of developing a disease return to normal. Slightly more than half believed that the risks return to normal within 5 years (Table 21). Results were similar when stratified by smoking status.

The 1987 NHIS included questions regarding the health benefits of quitting in terms of specific disease risks. These data were not available for inclusion in this Report.

Discussion

It has been 25 years since the release of the first Surgeon General's Report on smoking and health. During that time, a major public health effort has been made to educate the public regarding the health consequences of smoking (see Chapters 6–8).

Public knowledge of the health risks of smoking has improved as a result of this massive public health education campaign. The belief that smoking is harmful to health has increased since 1964. In 1964, a majority of adults acknowledged the general health risk of smoking and believed that smoking is a major cause of lung cancer, but a minority believed that smoking increases the risk of COPD, heart disease, and premature birth. By the mid-1980s, a substantial majority of adults (including nonsmokers and smokers) recognized the general health risks of smoking and believed that smoking increases the risk of lung cancer, COPD, and heart disease, and prematurity, low birthweight, miscarriage, and stillbirths.

Knowledge of the risks of exposure to ETS has also increased markedly since 1974; in fact, this high level of belief preceded the release of the 1986 Surgeon General's Report on the health consequences of involuntary smoking.

Current Gaps in Public Beliefs About the Health Effects of Smoking

Despite the growing level of public knowledge noted above, a substantial *number* of Americans are still uninformed about or do not believe the health risks of smoking. These gaps in knowledge or beliefs are more evident when one considers the proportion of adults who do not acknowledge certain health risks rather than the proportion who do. For example, among smokers—for whom this information is particularly

TABLE 21.—Public knowledge about the health benefits of smoking cessation in relation to years of abstinence, 1986

	If someone gives up smoking completely, how long do you think it will take before their chances of developing a disease return to normal? (percentage indicating the following number of years)							
	<1	1–2	3–5	6–10	11–15	15	Never	Don't know
Current smokers	17	23	16	8	1	1	7	27
Former smokers	14	23	20	8	1	1	7	26
Never smokers	16	23	16	6	1	1	12	25

SOURCE: AUTS 1986 (US DHHS, in press).

relevant—10 percent in 1985 did *not* believe that smoking is harmful to health. In 1986, 15 percent did *not* think that a person who smokes is more likely than a person who does not smoke to get lung cancer. Similar proportions of smokers did *not* believe that smokers are more likely to get heart disease (29 percent), chronic bronchitis (27 percent), emphysema (15 percent), and laryngeal cancer (18 percent). These percentages correspond to 8 million to 15 million adult smokers in the United States.

Another gap exists in the public's understanding of the special health risks of women who smoke. Compared with 1964, in 1985 smokers were more than twice as likely to recognize smoking as a cause of premature delivery. However, in 1985, 24 percent of all women (smokers and nonsmokers combined) 18 to 44 years of age did not recognize the risk of prematurity; 15 percent did not recognize the risk of low birthweight; 25 percent did not recognize the risk of miscarriage; and 32 percent did not recognize the risk of stillbirth (Table 12; Fox et al. 1987).

The fact that in 1985 10 percent of smokers did not indicate that smoking is harmful to health (Table 2), despite all efforts designed to impart such information (Chapters 6–8), suggests that this group of smokers may resist accepting any information on the health effects of smoking. This finding has important implications for smoking control efforts and for setting public health objectives. It implies that other techniques besides providing information (e.g., policy incentives—see Chapter 7) are necessary to persuade some smokers to quit. It also suggests that it is unrealistic to set a goal above 90 percent of smokers for public knowledge about any health effect of smoking.

Another gap in public knowledge involves teenagers. Youth may understand that smoking is generally harmful to health, but many may not appreciate the addictive nature of smoking or may deny a personal susceptibility (Leventhal, Glynn, Fleming 1987). In addition, data from one study (US DHHS 1986c) suggest that many ST users are not aware of the health effects and addictiveness of the product.

Fishbein (1977) described three different ways in which individuals may be informed of a given piece of information: (1) they may become aware that the information exists; (2) they may accept the information in general; or (3) they may accept the information at a personalized level. These three ways of being informed correspond to three levels of belief mentioned at the beginning of this Chapter: Level 1 (awareness), Level 2 (general acceptance), and Level 3 (personalized acceptance).

Persons may have knowledge or beliefs at one level, but not at another. For example, some smokers may be aware of the Surgeon General's Reports and accept the general fact that smoking is dangerous, but do not believe that they will be harmed by smoking. The data presented in this Report support this concept. Whereas in 1975 approximately 90 percent of smokers believed that smoking is harmful to health (Table 2), in 1986 only 75 percent were concerned about the effects of smoking on *their* health (Table 15). The recognition of a general risk but disbelief in a personal risk may result from several factors, including a belief that using low-tar cigarettes (see Table 3), smoking fewer cigarettes daily (see Table 5), or having certain genetic factors eliminates the personal risk.

In order to make a fully informed decision, a person should have complete and accurate Level 3 beliefs about the outcomes of each alternative action (Fishbein 1977). The personalization (perception of the personal relevance) of abstract information has

been shown to be an important aspect of behavior change in general (Mahoney 1974) and of health-related behavior change in particular (Ben-Sira 1982; Schinke and Gilchrist 1984).

Factors Interfering With Changes in Knowledge

There is a vast body of literature pertaining to the acquisition of knowledge and the process of learning. Research in this area has identified many factors that enhance or interfere with this acquisition. The brief discussion below does not attempt to provide a comprehensive review of this literature, but rather attempts to identify a few of the more salient factors that may impede the development of accurate beliefs about the health risks of smoking. The importance of beliefs in determining smoking behavior is discussed in Part II of Chapter 5 (sections on Cognition and Decisionmaking).

Informing the public about the health risks of smoking is difficult to accomplish. Risk assessment is a complex discipline, not fully understood by its practitioners, much less the lay public (Slovic 1986). Risk judgments are influenced by the memorability of past events; as a result, any factor that makes a risk memorable—such as a recent disaster or heavy media coverage—seriously distorts the perception of risk. Risks from dramatic and sensational causes of death, such as injuries, homicides, and natural disasters, tend to be greatly overestimated. Risks from undramatic causes, such as bronchitis, emphysema, or cancer, which take one life at a time and which may be more common in nonfatal form, tend to be underestimated (Slovic 1986). News media coverage of health risks has been found to be biased in the same direction, thus contributing to the difficulties of obtaining proper perspective on risks (Slovic 1986).

The fact that perceptions of risk are often inaccurate may indicate the need for warnings and educational programs. Such programs, however, face the obstacle that information based on probability is likely to have less impact on recipients than information based on certainty. For example, the data presented herein indicate that the majority of smokers believe that smoking increases the *chance* of getting lung cancer. However, not all smokers develop lung cancer, and on occasion, a well-publicized case of lung cancer occurs in an individual who never smoked. These "exceptions" may provide smokers with a rationale to continue smoking despite their abstract belief of risk.

In addition to their difficulty with understanding risks, smokers may deny personal risk with respect to health effects of smoking and addiction. Some smokers incorrectly believe that while smoking may be hazardous to others, it is not hazardous to themselves because of the particular type of cigarette they smoke, the amount they smoke, or their family history of disease. Persons who are exposed to a health risk, such as smokers, may attempt to reduce the anxiety generated in the face of that risk by denying the existence or magnitude of the risk, thus making the risk seem so small that it can be safely ignored (Slovic 1986).

Teenagers pose a special challenge for sharing knowledge of the health risks of smoking. As mentioned above and as shown in Table 18, the majority of high school seniors do believe that smoking is generally harmful. However, the fact that the health risks are in the distant future for teenage smokers may make it difficult for them to fully appreciate those risks. In other words, this lag may reduce teenagers' likelihood to

transform Level 2 beliefs to Level 3 beliefs. This is one reason smoking prevention efforts now tend to emphasize social influence approaches and to deemphasize communication of the long-term health risks of smoking (Chapter 6).

Although empirical evidence is sparse, tobacco industry activities in the form of advertising and promotion, public relations, and lobbying may interfere with public beliefs and personalized acceptance of the health risks of smoking. Because most individuals may not understand *how* smoking causes the diseases with which it is associated, many persons may be vulnerable to information that attempts to cast doubt on such relationships. These industry activities are reviewed in Chapters 6 and 7.

The 1990 Health Objectives for the Nation

In 1980, the U.S. Public Health Service established the 1990 Health Objectives for the Nation (US DHHS 1980). A midcourse review of progress toward meeting these objectives was published in 1986 (US DHHS 1986b). These objectives included five goals for public knowledge of the health consequences of smoking:

> Objective 1: By 1990, the share of the adult population aware that smoking is one of the major risk factors for heart disease should be increased to at least 85 percent.
>
> Objective 2: By 1990, at least 90 percent of the adult population should be aware that smoking is a major cause of lung cancer, as well as multiple other cancers including laryngeal, esophageal, bladder, and other types.
>
> Objective 3: By 1990, at least 85 percent of the adult population should be aware of the special risk of developing and worsening chronic obstructive lung disease, including bronchitis and emphysema, among smokers.
>
> Objective 4: By 1990, at least 85 percent of women should be aware of the special health risks for women who smoke, including the effect on outcomes of pregnancy and the excess risk of CVD with oral contraceptive use.
>
> Objective 5: By 1990, at least 65 percent of 12-year-olds should be able to identify smoking cigarettes with increased risks of serious disease of the heart and lungs.

For the purposes of these objectives, the term aware was not defined and no distinction was made between Level 1, Level 2, and Level 3 beliefs (see above).

Progress toward meeting the first two objectives cannot be assessed reliably because they refer to smoking as "one of the major risk factors" for heart disease and "a major cause" of lung cancer and other cancers. On the other hand, most surveys have assessed public beliefs about whether smoking increases the risk of or "is related to" heart disease or lung cancer (Tables 8 and 9). As mentioned above, such wording changes can markedly affect results of surveys assessing public beliefs.

The third objective appears to have been met in the case of emphysema and nearly met in the case of chronic bronchitis (Table 10). In 1985, the percentages of adults 18 to 44 years of age who acknowledged the various effects of maternal smoking on the fetus were generally 10 to 20 percentage points below the goals listed in the fourth objective, except that 85 percent of women believed that smoking during pregnancy in-

creases the risk of having a low-birthweight baby (Table 12). The percentage who knew of the interactive effects of smoking and oral contraceptive use on CVD was also below the 1990 goal. No data exist to assess progress toward achieving the fifth objective.

Trends in Public Attitudes About Smoking and Smokers

This Section describes trends in public attitudes about smoking in general and about smokers.

Involuntary Smoking as an Annoyance

Since 1964, the population has become increasingly annoyed by exposure to ETS. In 1964, less than half of adults (46 percent) thought that it was annoying to be near a person smoking cigarettes (Table 22). Identical questions asked in surveys conducted in 1964, 1966, 1970, and 1975 reveal an increase in the proportion of adults who were annoyed by being near a person who is smoking (from 20 to 35 percent among smokers and from 64 to 77 percent among nonsmokers). By 1986, 42 percent of smokers and 80 percent of nonsmokers reported that they were annoyed by the smoke from another person's cigarette. The 1987 NHIS (preliminary first-quarter data) obtained results similar to those of the 1986 AUTS.

Nonsmokers' Rights

According to Gallup surveys, the proportion of adults who feel that smokers should refrain from smoking in the presence of nonsmokers increased slightly between 1983 and 1987. In 1983, 69 percent of adults thought that smokers should refrain from smoking in the presence of others (Table 23). By 1987, 77 percent of adults (64 percent of smokers and 86 percent of nonsmokers) thought that smokers should refrain from smoking in front of others.

In the 1987 Gallup survey, respondents were asked where smokers should refrain from smoking when nonsmokers are present. The proportions who believed that smokers should not smoke in the presence of nonsmokers were 62 percent with respect to public places, 34 percent with respect to work, and 19 percent with respect to the home (ALA 1987).

In a 1987 survey conducted for AMA, respondents were asked, "Which do you feel is a more important individual right, the right of smokers to smoke anywhere, or the right of nonsmokers to a smoke-free environment?" Three-quarters of respondents (76 percent) thought that nonsmokers had the right to a smoke-free environment (49 percent of smokers and 86 percent of nonsmokers), compared with 10 percent who thought that smokers had the right to smoke anywhere (25 percent of smokers and 5 percent of nonsmokers) (Harvey and Shubat 1987).

TABLE 22.—Trends in public attitudes about exposure to environmental tobacco smoke

Survey	Year	Reference	It is annoying to be near a person who is smoking cigarettes (percentage who agree by smoking status)				
			Current smokers	Former smokers	Never smokers	All nonsmokers	All adults
1. AUTS	1964	US DHEW 1969	20	49	69	64	46
2. AUTS	1966	US DHEW 1969	26	52	70		48
3. AUTS	1970	US DHEW 1973	34	63	78	73	59
4. AUTS	1975	US DHEW 1976	35	72	79	77	63
5. Roper	1978	Roper 1978	5			60	
6. AUTS	1986	US DHHS, in press	42	73	83	80	69
7. NHIS[a]	1987		34	73	85		67

[a]Preliminary first-quarter data (unpublished).

NOTE: Actual questions:

1–4. *It is annoying to be near a person who is smoking cigarettes. (strongly agree, mildly agree, no opinion, mildly disagree, strongly disagree)*[*]

6. Is the smoke from someone else's cigarette very annoying to you, somewhat annoying to you, or not annoying at all?[†]

7. In general, would you say the smoke from other people's cigarettes is very annoying to you, somewhat annoying to you, or not at all annoying?[†]

[*]Percentages include those who "strongly agree" or "mildly agree."

[†]Percentages include those who state that smoke from someone else's cigarette is "very annoying" or "somewhat annoying."